DRAFT --- March 2006

Appendix H

Correspondence regarding monthly salinity simulations for Taylor River Interim CERP Update Runs

June 27, 2005
Revised September 25, 2005

Ms. Melody Hunt, PhD
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33406

Subject: Monthly Salinity Simulations for Taylor River Interim CERP Update Runs

Dear Ms. Hunt:

Environmental Consulting & Technology, Inc. (ECT) is currently providing professional services associated with salinity modeling for the South Florida Water Management District's Minimum Flows and Levels project for Florida Bay. As part of that work, ECT was requested to prepare simulations of monthly salinity at the Taylor River monitoring station (Everglades National Park Marine Monitoring Network) for the following Interim CERP Update (ICU) alternatives:

- 2000CERP
- 2050CERP
- CERP1
- NSM 4.6.2.

The salinity model that was used was the multivariate linear regression (MLR) model that was developed for the Park by Marshall (2004). The Taylor River MLR salinity model (daily resolution) is:

Taylor River salinity = 83.17 - 15.09CP[lag4] + 0.835Kwwatlev - 7.83(P33-P35)[lag1] - 4.34(P33-P35)[lag4]

where:

CP = stage (NGVD) at Craighead Pond
Kwwatlev = Key West water level (MSL)
P33 = stage (NGVD) at P33
P35 = stage (NGVD) at P35
Lag1 = one-day lag
Lag4 = four-day lag.

Details on model development can be found in Marshall, 2004.

These data used for CERP alternative simulations was obtained on August 25, 2004 from the Interagency Modeling Center for performance measure modeling being performed by this investigator for the Southern Estuaries Sub-team of RECOVER and the U.S. Army Corps of Engineers. The e-mail communication included as Appendix A to this letter report, following the text and plots, provides the information needed to document the source of the CERP alternatives input data. These data are known to be the most up-to-

date simulations from the South Florida Water Management Model at the time that this Taylor River modeling effort was conducted. The values of the Key West water level were obtained from the NOS website (http://tidesonline.nos.noaa.gov/).

The daily simulation values produced by the model were averaged to monthly values for this task. Because there are missing values in the Key West water level time series, some of the monthly averaged values were computed from less than 30, 31, or 28 day values. The PROC EXPAND SAS routine that averages the values assigns the monthly value to the first day of the month. The routine also begins the averaging procedure with the first month that has a daily value on the first day of the month. Because there are lagged values in the salinity model, the first month that satisfies this requirement is February 1965, so there is no monthly value for January 1965.

A plot of each monthly simulation is included below as Figures 1, 2, 3, and 4. Figure 5 presents a comparison of the salinity simulations for all four ICU alternatives runs. While it is difficult to make out the details of the differences in the simulations, Figure 5 indicates that the highest salinity values are, in general, produced by the CERP2000 and CERP 2050 runs, with CERP1 having lower values, and NSM 4.6.2 producing the lowest salinity values overall. This is similar to the results published by Marshall (2005) for the Southern Estuaries Sub-team of RECOVER at this station for daily values.

It is noted that there are times when the 2000CERP monthly simulation value is equal to or higher than the 2050CERP monthly simulation, which is seemingly contrary to results that are presented in Marshall (2005) for a number of other stations in Florida Bay. This is because the observed salinity at the Taylor River station is at or near 0 psu for most wet season months, which is also seen in the 2000CERP and 2050CERP simulations. Plots shown in Marshall (2005) have been included in this report as Figures 6, 7, and 8. As can be seen there is no difference in the 25^{th} quartile value for both runs, and the 25^{th} quartile value is 0. However, the annual mean and 75^{th} quartile values are both greater for 2050CERP compared to 2000CERP, confirming that the model is performing as expected at this station. Additionally, the monthly average time series for both of these CERP alternative runs contain values that may have been computed in months with a substantial number of missing daily values, at times greater than 15 values. Though these monthly values were removed from monthly reconstruction previously completed, theses monthly values have not been eliminated from the CERP alternative simulations.

Several files with all of the data that were generated and copies of the plots are provided as deliverables. Should you have any questions regarding any of this, please give me a call.

Respectfully,

Frank E. Marshall III, PhD, P.E.

References Used:

Marshall III, F. E.; D. Smith; and D. Nickerson. 2004. Using Statistical Models to Simulate Salinity Variation and Other Physical Parameters in North Florida Bay. Cetacean Logic Foundation, Inc. New Smyrna Beach, Florida.

Marshall III, F.E. 2005. RECOVER Southern Estuaries Performance Measues: Identification of Hydrology-Salinity Relationships for Coastal Estuaries and Analysis of Interim CERP Update Scenarios. Environmental Consulting & Technology, Inc. New Smyrna Beach, Florida.

Figure 1. Taylor River monthly average salinity simulation for the CERP 2000 alternative.

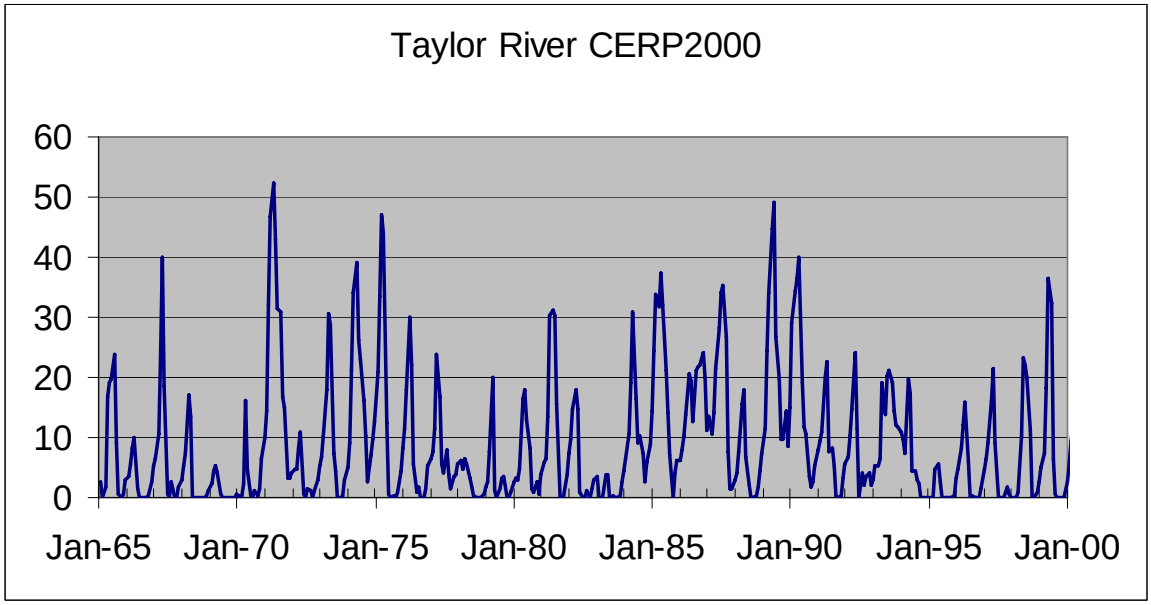


Figure 2. Taylor River monthly average salinity simulation for the CERP 2050 alternative.

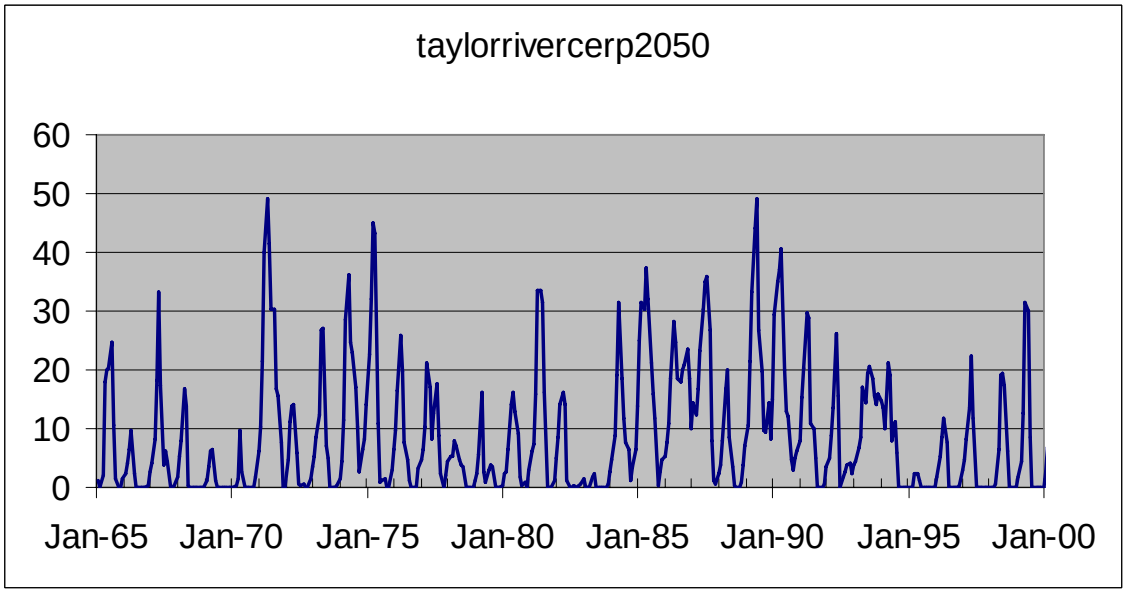


Figure 3. Taylor River monthly average salinity simulation for the CERP 1 alternative.

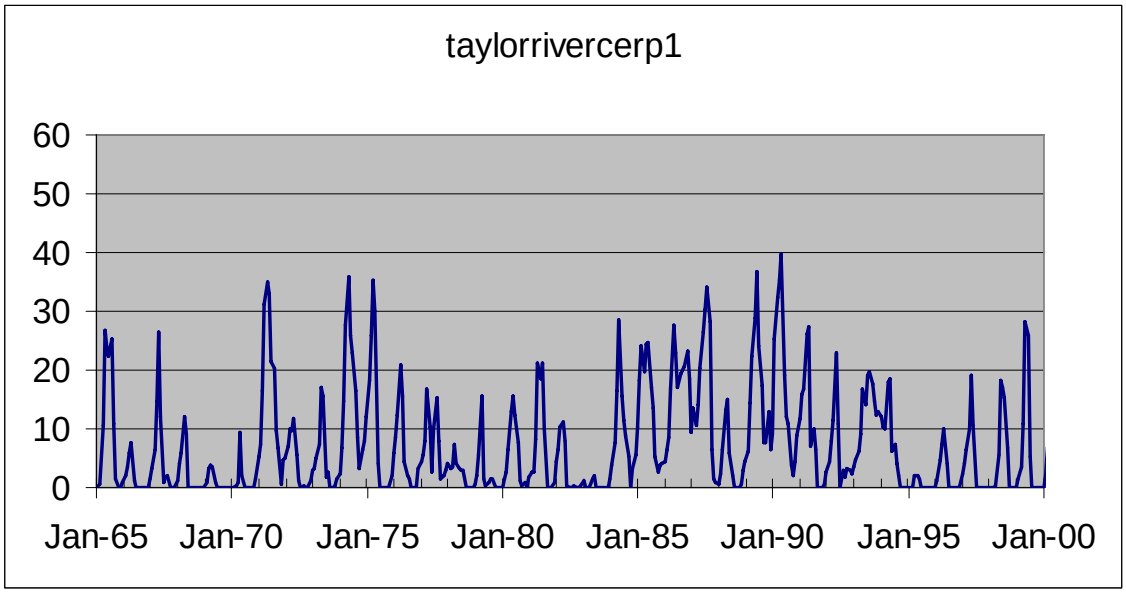


Figure 4. Taylor River monthly average salinity simulation for the NSM 4.6.2 alternative.

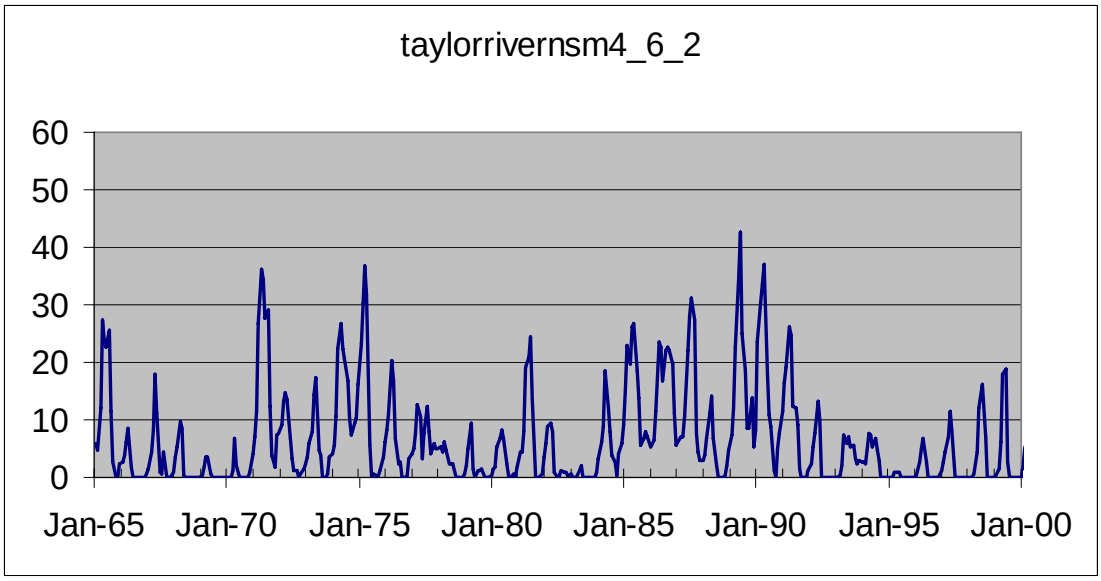


Figure 5. Comparison of all Taylor River monthly average salinity ICU simulations.

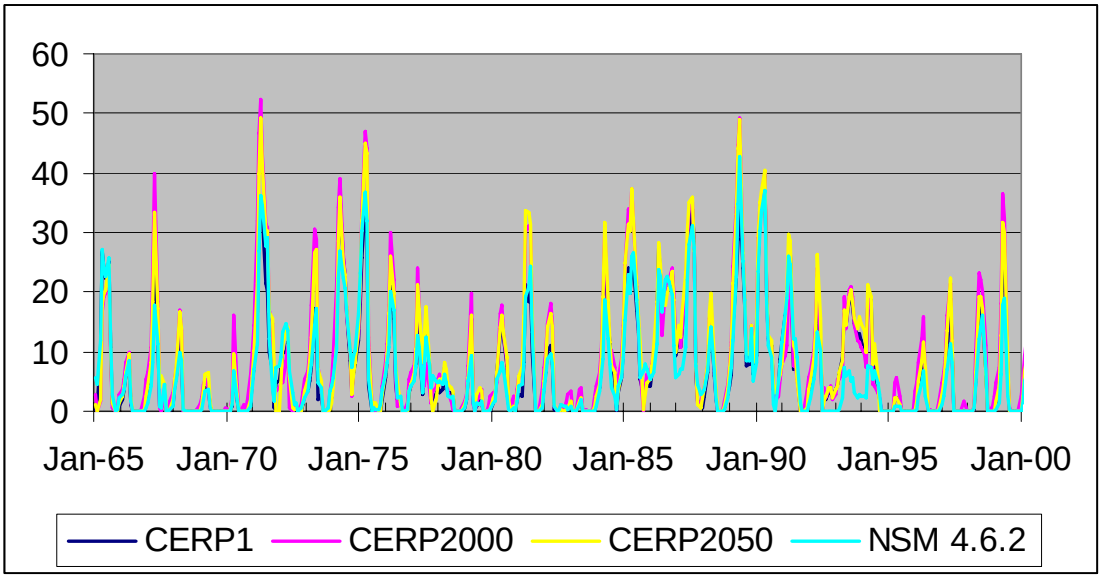


Figure 6. Annual mean value comparison from Marshall (2005). Values were computed from daily values, and results for simulations not included in this letter report are shown.

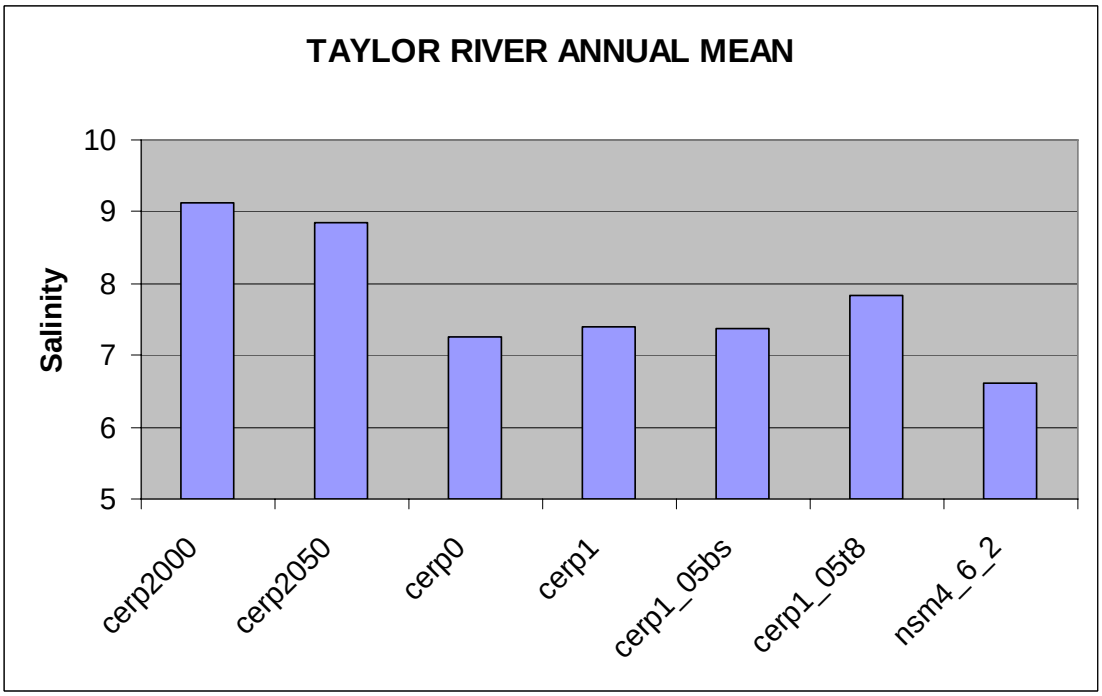


Figure 7. 25th quartile value comparison from Marshall (2005). All values are 0. Values were computed from daily values, and results for simulations not included in this letter report are shown.

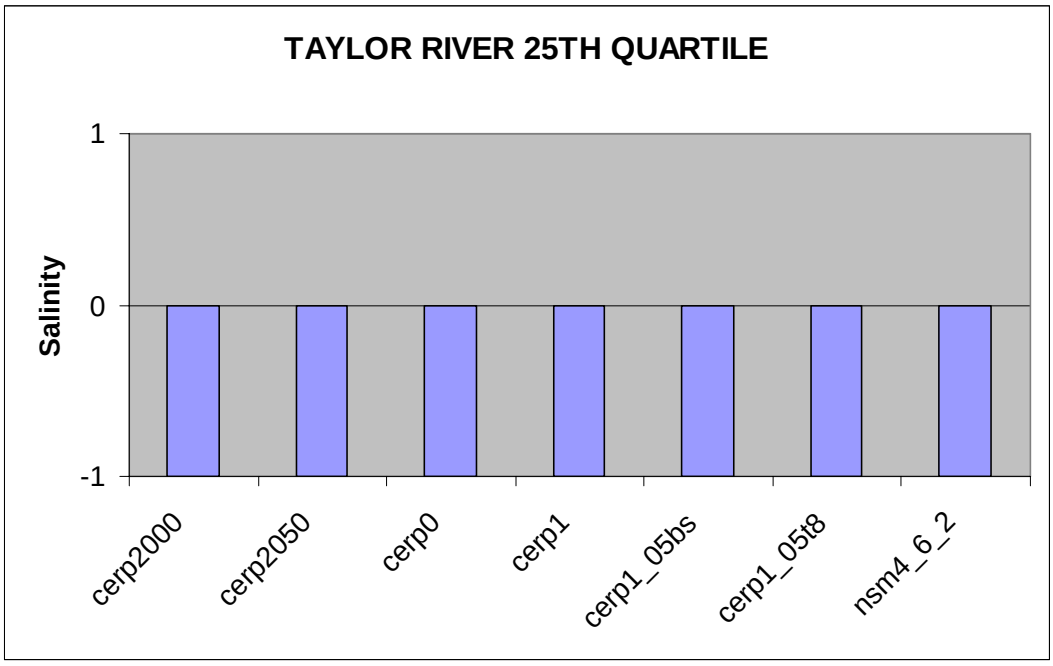
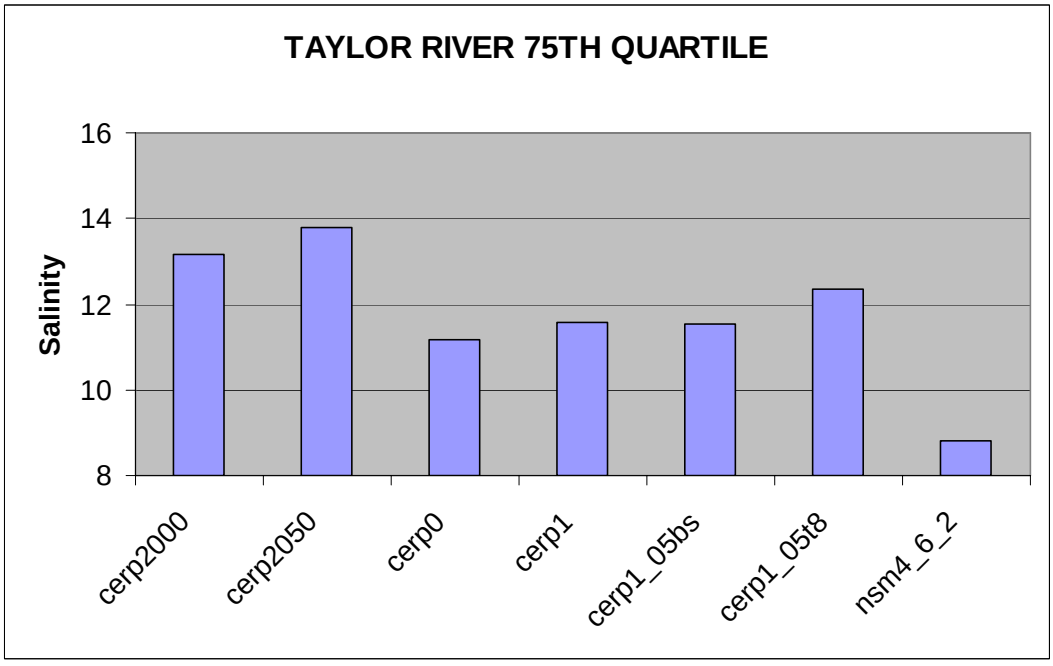


Figure 8. 75th quartile value comparison from Marshall (2005). Values were computed from daily values, and results for simulations not included in this letter report are shown.



Appendix A.

The following e-mail message documents the source of the data used for the CERP alternative simulations.

From: Xu, Hong [hxu@sfwmd.gov]
Sent: Thursday, August 26, 2004 7:58 AM
To: fmarshall@ectinc.com; Otero, Jose; Wilcox, Walter; Xu, Hong
Subject: RE: 2X2 Output

Frank,

Attached are the data for the following cells as you requested:

CERP1.05BS
D13R
Cell list (row,column):

5 21 - E146
6 26 - EVER6
7 17 - NP46
11 17 - NP62
12 15 - P35
4 20 - CP
17 20 - P33
6 20 - P37
8 23 - R127
17 24 - G3273
8 25 - EVER4
6 25 - EVER7
15 21 - NP206
9 16 - P38
8 28 - EVER1

row 8 column 28 for CERP0, CERP1.05t8, 2000CERP, and 2050CERP runs.

If you have any questions, please let me know. Thanks!

Hong

-----Original Message-----

From: Wilcox, Walter
Sent: Wednesday, August 25, 2004 2:51 PM
To: Xu, Hong
Subject: FW: 2X2 Output

This is request #2 that we discussed...

-----Original Message-----
From: Frank E. Marshall, III [mailto:fmarshall@ectinc.com]
Sent: Wednesday, August 25, 2004 11:29 AM
To: Wilcox, Walter
Subject: RE: 2X2 Output

Walter -

Sorry to bother you again, but I see a mistake in my original message to you. I requested CERP0, CERP1.05t8, 2000CERP, and 2050CERP for the wrong cell. EVER1 is in row 8 column 28, NOT ROW 8 COLUMN 25.

I hope that this error didn't cause a problem.

Frank E. Marshall III, PhD, P.E.
Environmental Consulting & Technology, Inc
340 North Causeway
New Smyrna Beach, Florida 32169
(386) 427-0694
(386) 427-0889 - FAX
(386) 451-9381 - CELL

-----Original Message-----
From: Frank E. Marshall, III [mailto:fmarshall@ectinc.com]
Sent: Wednesday, August 25, 2004 10:24 AM
To: 'wwilcox@sfwmd.gov'
Cc: 'Buckingham, Cheryl A SAJ'
Subject: RE: 2X2 Output

Hey Walter -

I was just checking-in to see if you received my message below. If these data are available to me on a website and I can access it without bothering you, just let me know.

Frank E. Marshall III, PhD, P.E.
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-----Original Message-----
From: Frank E. Marshall, III [mailto:fmarshall@ectinc.com]
Sent: Thursday, August 19, 2004 10:50 AM
To: 'wwilcox@sfwmd.gov'
Cc: 'Buckingham, Cheryl A SAJ'
Subject: 2X2 Output

Walter -

Cheryl Buckingham has asked me to produce simulations for a couple of new runs. I have all of the data except the following:

CERP1.05BS
D13R (I thought that I had this, but I don't)
Cell list (row,column):
- 5 21 - E146
- 6 26 - EVER6
- 7 17 - NP46
- 11 17 - NP62
- 12 15 - P35
- 4 20 - CP
- 17 20 - P33
- 6 20 - P37
- 8 23 - R127
- 17 24 - G3273
- 8 25 - EVER4
- 6 25 - EVER7
- 15 21 - NP206
- 9 16 - P38
- 8 28 - EVER1

For cell 8, 25 (row/column), EVER1:
- CERP0
- CERP1.05t8
- 2000CERP
- 2050CERP

Could you please send me the daily_stage_minus_lsel for the above. Note that the cell list above has the EVER1 cell (8, 25) added, so it is slightly different than

the last cell list that I sent you several weeks ago. That is why I had to also request the data for that cell for the other runs.

If you have any questions or if I need to send this request to someone else, please let me know.

Thank you for your help. Thanks also for taking the time earlier this week to meet with me.

Frank E. Marshall III, PhD, P.E.
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